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Research

# Student-generated, faculty-vetted multiple-choice questions: Value, participant satisfaction, and workload

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## Abstract

*Objective:* To evaluate a student-generated question assignment in a pharmacotherapy course for (1) perceived educational value, (2) faculty and student satisfaction, (3) item quality, (4) workload, and (5) perceived benefit.
*Methods:* Second-year pharmacy students in a dual campus college participated in generating patient-based vignettes with associated multiple-choice questions for an exam. Submissions were assessed by faculty in terms of structure and content and then made available to all students as a study aid. Project evaluation included examination of item quality as well as faculty and student surveys exploring educational value, general satisfaction with the assignment, and workload.
*Results:* Post-project satisfaction surveys were completed by 97% of students ($n = 165$) and 100% of faculty ($n = 8$). Overall, 80% of students agreed or strongly agreed that they were proud of their group's final submission, and more than 85% agreed or strongly agreed that participation in the project assisted them in analyzing concepts and guidelines taught in class. All faculty members agreed or strongly agreed that the activity should be conducted in future offerings of the course. The average point biserial correlation coefficient for the student-generated items was 0.26 versus 0.22 for faculty-written items. Structure- and content-focused faculty spent an average of 27 minutes (SD 6) and 52 minutes (SD 14), respectively, to complete each assignment.
*Conclusion:* A student-generated question assignment can be feasibly conducted across two campuses as an active learning exercise that enhances student-perceived learning of pharmacotherapy principles with a high level of both student and faculty satisfaction.


*Keywords:* Active learning; Pharmacotherapy; Assessment; Multiple-choice questions; Instructor workload

## Introduction

Active learning has gained recognition as a valued component of contemporary educational programs, including those relevant to the education of healthcare professionals. In the *Accreditation Council for Pharmacy Education's Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the*

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*Doctor of Pharmacy Degree*, Guideline 11.2 states that "Faculty and preceptors should employ active learning strategies and encourage students to ask questions whenever possible."[1] In the years since the adoption of these standards, articles describing techniques to implement[2] and measure[3] active learning in pharmacy classrooms have been published.

One novel active learning strategy is the use of student-generated questions (SGQ). Angelo and Corss[4] advocated for student-generated test questions as a means to assist students in applying learned material to new problems and situations. They described the benefits as helping students determine how well they have learned the various content areas of the course and prepare for the test by reviewing notes and considering the critical aspects of the content. They also argue that this technique benefits instructors, including providing insight into what students consider the most important or memorable content and what they understand as fair and useful test questions.

Student-generated questions have been used for a variety of purposes. Buchanan and Rogers[5] implemented SGQs as a means to develop a bank of questions in high-enrollment courses. Kolluru[6] describes the use of student-generated multiple-choice questions as a means for "learning by teaching" in Medicinal Chemistry. Student-generated questions have also been used as study technique[7] and as a means for engaging students with the content of an Orientation to Pharmacy course.[8]

## Rationale and objectives

Previous scholarship provides insight into the educational potential of SGQs. However, less information exists about the quality of the multiple-choice questions generated or the required effort and satisfaction levels of participating students and instructors. Therefore, the following project was designed with the intent to assess not only the educational value of SGQs and the quality of the items produced but also the overall satisfaction, as well as the time spent with the process by students and faculty.

Specifically, the objectives of this research were to evaluate the use of SGQs in terms of (1) faculty and student perceptions of educational value, (2) faculty and student satisfaction, (3) the quality of the items generated, (4) the workload required, and (5) perceived benefits as measured by the value added relative to effort expended. This paper will describe the implementation and evaluation of student-generated cases and multiple-choice questions in a pharmacotherapy course.

## Materials and methods

This instructional innovation was developed and piloted in the cardiovascular section of a pharmacotherapy course. Instruction was delivered to second-year pharmacy students across two campuses and consisted of five hours of classroom instruction per week for 15 weeks. University of Minnesota Institutional Review Board approval for the pilot was sought and obtained.

### *Assignment logistics and grading*

Students ($n = 165$) were randomly assigned to working groups stratified by campus. In total, 41 student groups (comprised of 4–5 students each) developed a patient case scenario and two associated multiple-choice, therapeutics-based questions for their assigned topic. Each of the two multiple-choice questions was required to have four accompanying options (three distractors and one key). Correct answers needed to be defensible based on material covered in class, as well as referenced to the learning objective being tested and the learning materials provided (i.e., slides, handouts, and/or readings). Distractors were required to be plausible and accompanied by an explanation articulating the basis for their inaccuracy. On the first day of class, 20 minutes were spent didactically orienting the student body to the overall project and project materials. Students were provided with a detailed handout outlining the above requirements as well as educational materials on item writing (e.g., Bloom's Taxonomy); vignette, stem, and option development; and a completed example case with questions.

Student groups were awarded 0, 1, or 2 points for the project. Zero points were awarded to students who did not satisfactorily complete the assignment, 1 point was awarded to students who satisfactorily completed the assignment but turned in materials late, and 2 points were awarded to students who satisfactorily completed the assignment with all components turned in on time. The 2-point total (2% of final course grade) awarded to this assignment was chosen strategically to equate to a quiz.

One week prior to the final exam, students were provided with a compiled list of all finalized student-generated multiple-choice questions and cases. An official answer key was not provided, although students were encouraged to share answers and discuss the cases with one another. Students were informed at the outset that a target of 15–25% of the cardiovascular final exam questions would be taken from the student-generated questions. This proportion was considered appropriate for two reasons. First, it provided flexibility to the instructors to carefully select the best cases from all those submitted. Second, promising inclusion of this magnitude provided incentive for students to review all of the student-generated questions.

### *Faculty-vetting process*

Feedback was provided to strengthen the quality of the vignettes and items. Each student group was assigned two faculty reviewers: one who vetted their case and questions from a structure-focused perspective and a second faculty reviewer who focused primarily on therapeutic content.